EXHIBIT A

A Martin Marietta radar cross section (RCS) measurement range is being established in a remote, undeveloped ranch-land and swamp-land area approximately 4 miles south of the East-West Bee-Line expressway linking Orlando, Florida to the Titusville-Cocoa area, approximately mid-way between the east and west limits of the expressway.

The range is being constructed on an interior 3600 acre rectangular portion of the 400,000 acre Deseret Ranch, those 3600 acres having been acquired by Martin Marietta Orlando Aerospace under a 10-year lease with option-to-buy.

Its perimeter is fenced by 15 miles of D.O.D. approved security fence, 8-feet high topped by 3-strand barbed wire. Access is controlled by an entrance guard post approximately 3/4 mile south of the northwest corner of the property. The guardpost is manned by Martin Marietta security guards on a 24-hour, 7-day week basis, with roving security patrols within the fenced area during classified data taking periods.

Roving and gate guards are linked by FCC-licensed land-mobile radio to the Martin Marietta Security command post 25-miles N-NW of the range at the Orlando main plant.

Access to the property is strictly controlled because of the high security level of the measurements to be performed there. Visual access to range operation is denied by the distance and terrain from the target areas to the security fence perimeter, and by Martin Marietta Security control of access to the city of Cocoa's water standpipe just northwest of the property (by agreement with the city's water department).

Public access to the Bee-Line expressway is limited to toll booths in the Orlando and Titusville-Cocoa areas and at its intersection with State Route 520 northeast of the property. The Deseret Ranch and City of Cocoa further limit access to the private roads in the area surrounding the fenced perimeter.

Access to the closed equipment trailer is controlled via an enclosed personnel walkway from the cipher-locked security area in the range office module a few feet north of that trailer and its antenna supports. A resident RCS range manager will control all range operations in accordance with license provisions and applicable Government security directives.

Martin Marietta policy limits any identification of the facility and its activities to simply that it is "a test facility to be used in support of the company's programs."

The heart of the measurement facility is a flat asphalt-paved ground plane, 6000 feet long, extending from the transmitting antenna supports at 28° 22' 17" north-latitude and 81° 04' 40"west-longitude at an azimuth of 146° 56' south-east of north. Antennas are narrowbeam antennas, boresighted essentially horizontal parallel to that paved ground plane, down the ground-plane center line to target positioners at 2500 feet, 3000 feet, and 6000 feet from the antennas. The 2500 foot target location contains a below-ground rotator pit with 30-foot diameter turntable flush with the paved surface. The 3000 foot and 6000 foot target locations have 20-foot high and 53-foot high low-RCS target support pylons, respectively.

The range is a full-scale, far-field RCS ground-plane range, meeting the $\frac{2D^2}{\lambda}$ far-field criterion, and with antenna heights meeting the $\frac{0.8\ R\ \lambda\ min}{4\ ht.}$ to $\frac{1.1\ R\lambda max}{4\ ht}$ normal ground-plane range criterion. In the above expressions, λ is the radar wavelength, D is the target maximum dimension, ht is the target height, R is range to target, and λ min and λ max the radar wavelengths corresponding to the frequency limits of each operating band. The paved ground plane tapers in width from 60-feet at the antenna end to 534-feet wide at the 6000 foot end (corresponding to antenna null beamwidth at S-band). The 2500 foot target turntable is offset slightly from range centerline, the 3000-foot and 6000-foot target pylon being located on centerline. The paved ground plane carries FAA-required X-markings to warn pilots that it is not a landing strip.

Exhibit I gives the basic measurement radar system RF characteristics, showing the required antenna heights (up to 52 feet above the ground-plane elevation of 75 feet above mean-sea level).

Frequency bands, antenna sizes, transmitter types, peak powers, and 1-dB beamwidths in feet at the target plane for both azimuth and elevation planes are shown in Table I. Signal-to-noise and RF-loss plus noise figures parameters are also shown.

Exhibit II shows detailed gain, beamwidth and side-lobe parameters plus power ratings of those antennas.

Exhibit VI shows the antenna support assemblies alongside the equipment trailer. Single antenna dishes are used in each frequency band (diplexed for transmit and receive), for true monostatic RCS measurements.

Exhibit III gives the antenna design goals for the antenna mechanisms of Figure 1.

Exhibit IV, VII gives the system specifications, including peak transmitter pulse power in KW, antenna gain in dBi, minimum pulsewidths in nanoseconds, and the instantaneous bandwidths in MHz required.

Two basic PRF ranges will be used, 1 to 2 KHz and 60-70 KHz. Pulse widths will range form 100 nanoseconds to 200 nanoseconds. Step-chirped waveforms, (monotonic increasing in frequency) as shown in the footnotes of Table III will be used for some measurements requiring range resolution down to 6".

Average radiated power levels will be quite low as shown in Appendix I, 95% of the time being between only 0.6 to 0.4 watts, and the remaining 5% of the time between 6 and 14.3 watts.

Appendix I contains the calculations for duty cycle, average power, and effective radiated power corresponding to the parameters of Tables I through III. Note that only 5% of range operating time is expected to use the higher PRF's of 60,000 to 70,000 PPS with their higher average power and higher average effective radiated power. The in-phase addition of direct and ground-plane-reflected rays at the target height will cause power densities at target to be up to 4 times those corresponding to the values of Appendix I.

While the high-gain,narrow-beam antennas give significantly high peak and average effective radiated powers at the target, the low average power and favorable horizontal, fixed-azimuth boresighting of the narrow beams in the remote swamp-land locations minimize interference potential with other services in these bands.

Range operating efficiency and spectrum transmitting-time-conservation are enhanced by the multiple band operation capability of 1, 2, or 4 radar frequencies interleaved, minimizing the on-the-air time required to take the RCS data on a particular target.

Operation of the multi-frequency radar is computer-controlled, permitting positive lock-out of those frequencies so directed by the processing co-ordination of the RCS range licensing.

The range will be operated by skilled engineers and technicians with years of experience in RCS range operating, supported by operations-monitoring instrumentation traceable to the U.S. Bureau of Standards through the Martin Marietta Orlando Aerospace calibrations laboratory.

Frequency bands from 0.7 through 18.0 GHz are being implemented initially, with growth to include the 35 and 95 GHz bands planned. Frequency auth-orizations for all seven bands are requested at this time to permit quick reaction implementation of the growth bands as required by U.S. Government customers and in-house Martin Marietta IR&D programs.

Figures 1 and 2 from the U.S. Coast and Geodetic Survey and FAA Air Navigation maps show the range perimeter and the range centerline, the arrow head pointing in the boresight direction. Instrumentation trailer and antennas are at the arrow tail and the 6000 foot target pylon at the arrow point.

As is evident in Figures 1 and 2, favorable boresighting is maintained, the narrow beam horizontal radiation pattern directed over remote undeveloped swampland and ranchland away from east-coast Florida and Orlando area installations. A 60 to 70 foot high tree-line at the southeast end of the range centerline will absorb most of the radiated energy before it leaves the range property.